# akYtec IoT devices

# communication protocol description

## User guide

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# 1 Protocol description

The akYtec protocol is an exchange protocol designed to work with akYtec devices. It provides the ability to exchange data between end-devices and application platforms, monitor current state or exchange commands. The protocol is a binary half-duplex protocol optimized for operation on low-speed communication channels. It is based on RFC8949 (CBOR) binary data representation format.
Data from devices is transmitted as a set of “frames”. Each frame is an object containing complete information on any measurement or event. One data packet from a device may consist of one or more consecutive frames. The number of frames in one packet is variable and depends on the limitations of the data transmission channel, as well as on the number of frames available in the built-in queue of the device at the time of transmission.
Each frame from the device is an CBOR “map” type object, that contains a set of “**data units**”, that could be:

– Metrics
– Settings
– Commands

Every data unit is represented as record in “map” object: {ID: VALUE}, where:

– **ID**: Unique identifier of data unit
– **VALUE**: Data

The VALUE field can contain a single value or a CBOR array, in case if data unit is complex data. An example of composite data unit is LoRaWAN radio signal quality parameters, that contain two values: RSSI and SNR.

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# 2 Description of akYtec protocol data units

*Table 2.1 Description of akYtec protocol data units*

| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| **Metrics** | | | | | | | | |
| 0 | Timestamp | UP | Frame generation timestamp in the unix time (UTC) | integer | sec-onds | 1698240094 | Wed Oct 25 2023 13:21:34 GMT+0000 | |
| 1 | Serial | UP | Device unique serial number | integer | – | 123456 | Device serial number is 123456. | |
| 2 | Battery voltage | UP | Device battery voltage | integer | mV | 5500 | Device battery voltage is 5500 mV or 5.5 V. | |
| 3 | Power voltage | UP | External power voltage | integer | mV | 14200 | External power voltage is 14200 mV or 14.2 V. | |
| 4 | Uptime | UP | Device working time since last reboot | integer | sec-onds | 86400 | Device last reboot was 86400 seconds ago. | |
| 5 | Version | UP | Device firmware version [major, minor] | [integer, integer] | – | [10, 7] | Device firmware version is 10.7. | |
| 6 | ICCID | UP | Unique identifier of SIM-card installed in device | integer | – | 12345678901234567-89 | SIM ICCID is 1234567890123456789. | |
| 7 | IMEI | UP | Device modem IMEI | integer | – | 123456789012345 | Device IMEI is 123456789012345. | |
| 8 | Tamper | UP | Device enclosure state:<br>0: Closed<br>1: Opened | boolean | – | [1] | Device enclosure is opened. | |
| 9 | MCU tempera-ture | UP | Device MCU temperature multiplied by 10 | integer | °C | -145 | Device temperature is -14.5 °C. | |
| 10 | LoRaWAN signal | UP | LoRaWAN signal quality at last data exchange: [<RSSI>, <SNR>] | [integer, integer] | dB | [-85,-5] | RSSI is -85 dBm.<br>SNR is -5 dB. | |

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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| 11 | Nb-IoT signal | UP | Nb-IoT signal quality at last data exchange: [<RSSI>, <SNR>] | [integer, integer] | dB | [-74,2] | RSSI is -74 dBm.<br>SNR is 2 dB. | |
| 12 | Analog input | UP | Device analog input readings: [<InputNumber>, <Readings>] | [integer, integer] | [–, mV] | [2, 9200] | Device analog input 2 voltage is 9200 mV or 9.2 V. | not used |
| 13 | Security input | UP | Device security input readings: [<InputNumber>, <Readings>]<br><Readings>: 0: Normal, 1: Alarm, 2: Alarm Permanent | [integer, boolean] | [–, –] | [1,1] | Device security input 1 is in the alarm state.<br>Alarm | |
| 14 | Pulse input | UP | Device pulse input readings: <InputNumber>, <Readings>] | [integer, integer] | [–, coun-ter] | [2, 1023654] | Number of pulses on pulse input 2 of device is 1023654. | |
| 15 | Digital output | UP | Device digital output state: [<OutputNumber>, <EventCode>, <State>]<br><EventCode>: 0: Manual mode, 1: Auto mode<br><State>: 1: On, 0: Off | [integer, boolean, boolean] | [–, –, –] | [1, 0, 0] | Device digital output 1 is closed in the manual mode. | |
| 16 | Modbus | UP | Data read from an externally connected device via the Modbus RTU protocol: [<SlaveAddr>, <RegisterAddr>, <Readings>] | [integer, integer, integer] | [–, –, –] | [10, 0, 12254781] | Value of data read from an externally connected device via the Modbus RTU protocol is 12254781. Data is read from register 0 of slave device address 10. | |
| 17 | M-Bus | UP | Data is read from external connected device via M-Bus interface:<br>Array includes:<br>[Timestamp,<br><RSP_UD>,<br><SlaveSerial>, //serial number of M-Bus device in the little-endian byte order<br><Medium>, // see Section 8.4.1 Measured Medium Variable | [data] | | [B850C365<br>00<br>9524437200<br>02<br>00<br>00<br>00] | Unix timestamp in little-endian byte order<br>RSP_UD<br>Slave device serial number in little-endian byte order for example: 0xB850C365 is converted to 0x65C350B8 -> 1707299000 (Dec) -> 07.02.2024, 09:43:20 UTC.<br>M-Bus data: | |



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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| | | | Structure of the M-Bus specification<br><Status>, // Status package in accordance with the M-Bus specification<br><DIF>, // see Section 8.4.2 Data Field Codes of the M-Bus specification<br>[<DIFE ], // 0-10 bytes, see Section 6.3.2 Variable Data Blocks of the M-Bus specification<br><VIF>, // see Section 8.4.3. Codes for VIF of the M-Bus specification<br>[<VIFE>], // 0-10 bytes, see Section 8.4.5 Codes for VIFE of the M-Bus specification<br>[<DATA>] //1-12 bytes readings<br>For values of <RSP_UD>, <SlaveSerial>, <Medium>, <Status>, <DIF>, <DIFE>, <VIF>, <VIFE>, <DATA> refer to the M-Bus specification | | | | for example:<br>00952443720002000000<br>Slave Serial -><br>0x95244372 -><br>0x72432495 | |
| 18 | 4-20 mA input | UP | Device 4-20 mA input readings: [<InputNumber>, <Readings>] | [integer, integer] | [–, uA] | [2, 9450] | | not used |
| 19 | 0-10 V input | UP | Device 0-10 V input readings: [<InputNumber>, <Readings>] | [integer, integer] | [–, mV] | [1, 5250] | | not used |
| 20 | Tempera-ture input | UP | Device temperature input readings multiplied by 10: [<InputNumber>, <Readings>] | [integer, integer] | [–, °C] | [3;-25] | | not used |
| **Settings** | | | | | | | | |
| 1000 | General settings | | [<DataSendPeriodMinutes>, <Turn off indication>, <Antenna type>] | [integer, boolean, boolean] | [min, –<br>–] | [30,<br>0,<br>0] | Data transmission period 30 min<br>Indication enabled<br>Internal antenna | |



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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| | | | <DataSendPeriodMinutes>:<br>Period of data send attempts in minutes. Data will be sent only if device internal queue is not empty. Data may have values: 1, 5, 10, 30, 60, 240, 360, 720, 1440.<br><Turn off indication>:<br>0: Enable indication, 1: Disable indication.<br><Antenna type>: 1: External, 0: Internal | | | | | |
| 1001 | LoRaWAN settings | UP/ DOWN | [<Activation in network>,<br><Region>,<br><ADR>,<br><Starting speed>,<br><Synchronization period>,<br><RejoinPeriodMinutes>,<br><Confirmation>]<br><br><Activation in network>: 0: ABP, 1: OTAA<br><Region>:<br>0: EU868, 1: US915, 2: AS923, 3: RU864<br><ADR>: 0: Disabled, 1: Enabled<br><Starting speed>: 0: DR0, 1: DR1, 2: DR2, 3: DR3, 4: DR4, 5: DR5.<br><Synchronization period> MIn:<br>Period of time synchronization with the network.<br><RejoinPeriodMinutes> Min:<br>Period of join network attempts if device not joined to the network<br><Confirmation>:<br>0: Disabled, 1: Enabled | [integer,<br>integer,<br>boolean,<br>integer,<br>integer,<br>integer,<br>boolean] | | [1,<br>3,<br>1,<br>0,<br>20,<br>60,<br>1] | OTAA, EU868, ADR , DR0, Synchronization period 20 min, Rejoin period is 60 minutes, Confirmation enabled | |

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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| 1002 | Nb-IoT settings | UP/ DOWN | [<DataSendPeriodMinutes , <MqttAddress>, <MqttPort>, <MqttTopic>]<br><br><DataSendPeriodMinutes>: Period of data send attempts in minutes. Data will be sent only if device internal queue is not empty.<br><MqttAddress>: Address of server data should be sent to<br><MqttPort>: Port on server data should be sent to<br><MqttTopic>: Topic, data should be published to. Device will append "/<Serial>" to the end of the topic, where <Serial> is serial number of device. | | | | | not used |
| 1003 | Analog input settings | UP/ DOWN | [<InputNumber>, <IsEnabled>, <FrameGenerationPeriod>, <TriggerDataTransmission>]<br><InputNumber>: Device input number<br><IsEnabled>: 0: Disabled, 1: Enabled,<br><FrameGenerationPeriod>: 0: 1 hour, 1: 4 hours, 2: 12 hours, 3: 24 hours<br><TriggerDataTransmission>: 0: Data transmission isn't triggered, data will be just inserted in queue and sent in according with radio data send period setting.<br>1: Data transmission is triggered when frame is generated. | [integer, boolean, integer, boolean] | [–, –, Hour, –] | [1, 1, 2, 1] | Analog input 1 is enabled, data frame is generated every 12 hours and data transmission procedure is triggered. | not used |



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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| 1004 | Digital input settings | UP/ DOWN | [<InputNumber>,<br><InputMode>,<br><FrameGenerationPeriod>,<br><TriggerDataTransmission>,<br><TriggerMormDataTransmission>,<br><Permanent anti-bounce>,<br><Automatic alarm reset>]<br><InputNumber>: Device input number<br><InputMode>: 0: Pulse, 1: Alarm Opened, 2: Alarm Closed,<br>3: Disabled.<br><FrameGenerationPeriod>(min): [1,5,10,15,30,60,240,360,720,14-40]<br><TriggerDataTransmission>:<br>0: Data transmission isn't triggered, data will be just inserted in queue and sent in according with radio data send period setting.<br>1: Data transmission is triggered when frame is generated.<br><TriggerMormDataTransmission>:<br>0: Data transmission isn't triggered, data will be just inserted in queue and sent in according with radio data send period setting.<br>1: Data transmission is triggered when frame is generated.<br><Permanent anti-bounce>:(mS) [3 - 255]<br><Automatic alarm reset>(Sec.). Alarm is automatically reset, when the security input is restored.<br>0: Manual reset | [integer,<br>integer,<br>integer,<br>boolean,<br>boolean,<br>integer,<br>integer] | [–,<br>–,<br>min,<br>–<br>–,<br>mS,<br>S] | [1,<br>0,<br>60,<br>0,<br>0,<br>5,<br>0] | Input 1 is enabled, configured as pulse input that generate data frame every 1 hour and doesn't trigger data transmission procedure.<br>Debounce time 5 mS.<br>Manual reset alarm | |

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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| 1005 | RS-485 settings | UP/ DOWN | Device RS-485 interface settings:<br>[<Speed>,<br><Parity>]<br><Speed>: 0: 2400, 1: 4800,<br>2: 9600, 3: 14400, 4: 19200,<br>5: 38400, 6: 57600<br><Parity>: 0: None, 1: Even, 2: Odd | [integer, integer] | | [2,<br>0] | 9600 bps no parity<br>Parity – None | not used |
| 1006 | Modbus general settings | UP/ DOWN | <ModbusEnabled>,<br><PollPeriod>,<br><initiate data transfer>,<br><Operation from backup battery>,<br><Constant monitoring>,<br><Start polling all measurements><br><br><ModbusEnabled>: 1: On, 0: Off.<br><PollPeriod>: (Min) Period of polling slave for data to check if readings is in/out of thresholds<br>1: 1 min, 5: 5min, 10: 10 min,<br>30: 30 min, 60: 1 hour,<br>240: 4 hours, 360: 6 hours,<br>720: 12 hours, 1440: 24 hours.<br><Initiate data transfer>: 0: Off,<br>1: ALWAYS, 2: If state changed<br><Operation from backup battery>:<br>1: On, 0: Off.<br><Constant monitoring>: 1: On,<br>0: Off.<br><Start polling all measurements>:<br>1: On, 0: Off. | [boo-lean, integer, integer, boolean, boolean, boolean] | [–<br>min,<br>–,<br>–,<br>–,<br>–] | [1,<br>30,<br>0,<br>0,<br>0,<br>1] | Modbus enabled<br>Poll period 30 min<br>initiate data transfer – off<br>Operation from backup battery – off<br>Constant monitoring – off<br>Start polling all measurements – on | |
| 1007 | Modbus settings | UP/ DOWN | [<MeasurementNumber>,<br><MeasurementEnabled>,<br><SlaveAddress>,<br><BaudRate>,<br><Parity>,<br><Warm-up time>, | [integer, integer, integer, integer, integer, integer, integer, | | [2,<br>1,<br>20,<br>3,<br>1,<br>1, | Measurement #2<br>Enabled<br>Slave with address 14<br>BaudRate: 9600<br>Parity: None<br>Warm-up time 1 Sec. | |



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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| | | | <ModbusFunction>,<br><StartRegister>,<br><RegisterCount>,<br><Endian>,<br><IsSigned>,<br><HighThreshold>,<br><LowThreshold>]<br><br><MeasurementNumber>: Measurement number from 1 to 10<br><MeasurementEnabled>: 0: Disabled, 1: Enabled<br><SlaveAddress>: Modbus slave device address on bus<br><BaudRate>: 0: 1200, 1: 2400, 2: 4800, 3: 9600, 4: 14400, 5: 19200, 6: 28800, 7: 31250, 8: 38400, 9: 57600, 10: 76800, 11: 115200<br><Parity>: 0: None, 1: Even, 2: Odd<br><Warm–up time><br><ModbusFunction>: 1: Coils, 2: Inputs, 3: Holding registers, 4: Input registers<br><StartRegister>: Address of first register to read<br><RegisterCount>: Number of registers to read from 1 to 4<br><Endian> : 0: Little endian, 1: Big endian, 2: Little endian byte swap, 3: Big endian byte swap.<br><IsSigned>: 0: not signed, 1: signed<br><HighThreshold>: Upper threshold of read value<br><LowThreshold>: Lower threshold of read value | integer,<br>integer,<br>integer,<br>boolean,<br>integer,<br>integer] | | 3,<br>0,<br>10,<br>1,<br>0,<br>-1000,<br>1000] | ModbusFunction: holding registers<br>StartRegister: 0<br>RegisterCount: 10<br>Endian: big endian<br>IsSigned: not signed<br>Lower threshold is -1000<br>Upper threshold is 1000 | |



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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| 1008 | M-Bus general settings | UP/ DOWN | [< MeasurementEnabled , <FrameGenerationPeriodMi-nutes>]<br>< MeasurementEnabled :<br>0: Disabled, 1: Enabled<br><FrameGenerationPeriodMi-nutes>: Period of measurement frame generation: 1: 1 min, 5: 5 min, 10: 10 min, 30: 30 min, 60: 1 hour, 240: 4 hours, 360: 6 hours, 720: 12 hours, 1440: 24 hours. | [boo-lean, integer] | | [1,<br>5] | Enabled measurement<br>Frame generation period 5 minutes | |
| 1009 | M-Bus settings | UP/ DOWN | [<MeasurementNumber>,<br><SlaveSerial>,<br><BaudRate>,<br><MeasurementParameter><br><br><MeasurementNumber>: Measurement number from 1 to 10<br><SlaveSerial>: M Bus slave device serial number (secondary address)<br><BaudRate>: 0: 300, 1: 600, 2: 1200, 3: 2400, 4: 4800, 5: 9600<br><MeasurementParameter> Measurement parameter from 1 to 10 | [integer, integer, integer, integer] | | [1,<br>98765,<br>4,<br>[3,4,5]] | M-Bus measurement #1<br>Slave serial (secondary address) is 987654.<br>Baud rate – 4800<br>Poll slave and generate frame every hour<br>Measurement parameter 3,4,5 | |
| 1010 | 4-20 mA input settings | | N/A | | | | | |
| 1011 | 0-10 V input settings | | N/A | | | | | |
| 1012 | Tempera-ture input settings | | N/A | | | | | |



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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| 1013 | GNSS geoloca-tion settings | | N/A | | | | | |
| 1014 | Settings of Digital Output | | [<Alarm mode>,<br><Alarm output control. In1>,<br><Alarm output control. In2>,<br><Alarm output control. In3>,<br><Alarm output control. In4>]<br><Alarm mode>: 1: On, 0: Off.<br><Alarm output control. In (N):<br>1: On, 0: Off | [boo-lean, boolean, boolean, boolean, boolean] | | [1,<br>1,<br>1,<br>1,<br>1] | Digital output enabled by alarm.<br>Input 1 controls the digital output automatically in security mode.<br>Input 2 controls the digital output automatically in security mode, if available.<br>if there is no such input – 0. | |
| **Commands** | | | | | | | | |
| 2001 | Reboot | UP/ DOWN | Restart device | integer | | [1] | Restart device<br>example: {2001:[1]} | |
| 2002 | Reset to defaults | UP/ DOWN | Reset device to factory default settings | integer | | [1] | Reset device to the factory default settings<br>{2002:[1]} | |
| 2003 | Set device time | UP/ DOWN | Set device time to value in unixtime (UTC) format | integer | sec-onds | 1698240094 | Set device time to Wed Oct 25 2023 13:21:34 GMT +0000 | For Nb-IOT only |
| 2004 | Digital output control | UP/ DOWN | Control the device digital output<br>[<State>, <TimeAutoMode>]<br><State>: 0: Off, 1: On.<br><TimeAutoMode>:(Min) Switching time to automatic mode<br>for **CI201-LW** always – 0. | [boo-lean, integer] | | [1,<br>60] | Digital output is on.<br>Switches to automatic mode after 60 minutes<br>{2004:[1,60]} | |
| 2005 | Start all measure-ments | UP/ DOWN | Start all measurements | integer | | [1] | {2005:[1]} | |
| 2006 | Send packet | UP/ DOWN | Send packet | integer | | [1] | {2006:[1]} | |



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| ID | Name | Direc-tion | Description | Type | Units | Example | Explanation | Com-ments |
|---|---|---|---|---|---|---|---|---|
| 2007 | Manual reset alarm | UP/ DOWN | Manual reset alarm | integer | | [1] | {2007:[1]} | |
| 2008 | Find device | UP/ DOWN | Find device | integer | | [1] | {2008:[1]} | |
| 2009 | Erase flash | UP/ DOWN | Erase flash | integer | | [1] | {2009:[1]} | |
| 2010 | Reset counters | UP/ DOWN | Reset counters | integer | | [1] | {2010:[1]} | |
| 2011 | Reset device opening flag | UP/ DOWN | Reset device opening flag | integer | | [1] | {2011:[1]} | |
| 2012 | Rejoin | UP/ DOWN | Rejoin | integer | | [1] | {2012:[1]} | |

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# 3 Examples of akYtec protocol data frames

| Frame description | Diagnostic notation | Annotated HEX |
|---|---|---|
| Device information frame.<br>It should be sent after every device restart and every 48 hours, contains data units:<br>– Timestamp<br>– Serial number<br>– Firmware version<br>– MCU temperature<br>– Uptime<br>– Tamper<br>– Battery voltage<br>– External voltage<br>– LoRaWAN signal | {<br>0: 1702733757,<br>1: 72012345,<br>5: [0, 1],<br>9: 0,<br>4: 45,<br>8: 0,<br>2: 6303,<br>3: 10848,<br>10: [-42, 14]<br>} | A9 # map(9)<br>00 # unsigned(0)<br>1A 657DA7BD # unsigned(1702733757)<br>01 # unsigned(1)<br>1A 044AD239 # unsigned(72012345)<br>05 # unsigned(5)<br>82 # array(2)<br>00 # unsigned(0)<br>01 # unsigned(1)<br>09 # unsigned(9)<br>00 # unsigned(0)<br>04 # unsigned(4)<br>18 2D # unsigned(45)<br>08 # unsigned(8)<br>00 # unsigned(0)<br>02 # unsigned(2)<br>19 189F # unsigned(6303)<br>03 # unsigned(3)<br>19 2A60 # unsigned(10848)<br>0A # unsigned(10)<br>82 # array(2)<br>38 29 # negative(41)<br>0E # unsigned(14) |
| Digital input 1 data frame (input is configured as pulse) could be sent periodically, contains data units:<br>– Timestamp<br>– Pulse input 1 data | {<br>0: 1702733757, // Sat Dec 16 2023 13:35:57 GMT+0000<br>14:[1, 10] // 10 pulses on input 1<br>} | A2 # map(2)<br>00 # unsigned(0)<br>1A 657DA7BD # unsigned(1702733757)<br>0E # unsigned(14)<br>82 # array(2)<br>01 # unsigned(1)<br>0A # unsigned(10) |
| Security input 3 data frame could be sent periodically or based on alarms, contains data units:<br>– Timestamp | {<br>0: 1702733757, // Sat Dec 16 2023 13:35:57 GMT+0000 | A2 # map(2)<br>00 # unsigned(0)<br>1A 657DA7BD # unsigned(1702733757)<br>0D # unsigned(13) |



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| Frame description | Diagnostic notation | Annotated HEX |
|---|---|---|
| – Security input 3 data | 13:[3, 1] // Security input 3 is in the alarm<br>state<br>} | 82 # array(2)<br>03 # unsigned(3)<br>01 # unsigned(1) |

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## 4 Examples of device commands

*Table 4.1 Settings of commands used for CI200-LW*

| Settings/Commands | Direction | DOWN | UP | Data transmission period | Frame saving period |
|---|---|---|---|---|---|
| 1000 | UP/DOWN | {1000:[1,0,0]} | {0:72012345, 1000: [1,0,0]} | Command | |
| 1001 | UP/DOWN | {1001:[1,3,1,0,20,60,1]} | {0:72012345,1001: [1,3,1,0,20,60,1]} | Command | |
| 1004 | UP/DOWN | {1004:[1,0,60,0,0,5,0]} | {0:72012345,1004: [1,0,60,0,0,5,0]} | Command | |
| 1014 | UP/DOWN | {1014:[0,1,1,1,1]} | {0:72012345,1014: [0,1,1,1,1]} | Command | |
| 2001 | DOWN | {2001:[1]} | | Command | |
| 2002 | UP/DOWN | {2002:[1]} | {0:72012345,2002:[1]} | Command | |
| 2004 | UP/DOWN | {2004:[1,5]} | {0:72012345,2004: [1,5]} | Command | |
| 2005 | UP/DOWN | {2002:[1]} | {0:72012345,2005:[1]} | Command | |
| 2006 | UP/DOWN | {2006:[1]} | {0:72012345,2006:[1]} | Command | |
| 2007 | UP/DOWN | {2007:[1]} | {0:72012345,2007:[1]} | Command | |
| 2008 | UP/DOWN | {2008:[1]} | {0:72012345,2008:[1]} | Command | |
| 2009 | UP/DOWN | {2009:[1]} | {0:72012345,2009:[1]} | Command | |
| 2010 | UP/DOWN | {2010:[1]} | {0:72012345,2010:[1]} | Command | |
| Device information frame includes frames: (0,5,9,4,8,2,3,10) | UP | | {0: 1706845405, 1: 73012347, 5: [0, 1], 9: 0, 4: 45, 8: 0, 2: 6303, 3: 10848, 10: [-42, 14]} | 48 hours For example 24 hours | 48 hours For example 24 hours |
| 13 | UP | | {1: 72012345, 13:[1,0]} | Setting | State changed |



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| Settings/Commands | Direction | DOWN | UP | Data transmission period | Frame saving period |
|---|---|---|---|---|---|
| 14 | UP | | {1: 72012345, 14: [2,4558]} | Setting | Setting |
| 15 | UP | | {1: 72012345, 15:[1,0]} | Setting | State changed |

*Table 4.2 Settings of commands used for CI201-LW*

| Settings/Commands | Direction | DOWN | UP | Data transmission period | Frame saving period |
|---|---|---|---|---|---|
| 1000 | UP/DOWN | {1000:[1,0,0]} | {0:72012345, 1000: [1,0,0]} | Command | |
| 1001 | UP/DOWN | {1001:[1,3,1,0,20,60,1]} | {0:72012345,1001: [1,3,1,0,20,60,1]} | Command | |
| 1004 | UP/DOWN | {1004:[1,0,60,0,0,5,0]} | {0:72012345,1004: [1,0,60,0,0,5,0]} | Command | |
| 1014 | UP/DOWN | {1014:[0,1,1,1,1]} | {0:72012345,1014: [0,1,1,1,1]} | Command | |
| 2001 | DOWN | {2001:[1]} | | Command | |
| 2002 | UP/DOWN | {2002:[1]} | {0:72012345,2002:[1]} | Command | |
| 2004 | UP/DOWN | {2004:[1,0]} | {0:72012345,2004: [1,0]} | Command | |
| 2005 | UP/DOWN | {2002:[1]} | {0:72012345,2005:[1]} | Command | |
| 2006 | UP/DOWN | {2006:[1]} | {0:72012345,2006:[1]} | Command | |
| 2007 | UP/DOWN | {2007:[1]} | {0:72012345,2007:[1]} | Command | |
| 2008 | UP/DOWN | {2008:[1]} | {0:72012345,2008:[1]} | Command | |
| 2009 | UP/DOWN | {2009:[1]} | {0:72012345,2009:[1]} | Command | |
| 2010 | UP/DOWN | {2010:[1]} | {0:72012345,2010:[1]} | Command | |

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| Settings/Commands | Direction | DOWN | UP | Data transmission period | Frame saving period |
|---|---|---|---|---|---|
| Device information frame includes frames: (0,5,9,4,8,2,3,10) | UP | | {0: 1706845405, 1: 73012347, 5: [0, 1], 9: 0, 4: 45, 8: 0, 2: 6303, 3: 10848, 10: [-42, 14]} | 48 hours For example 24 hours | 48 hours For example 24 hours |
| 13 | UP | | {1: 72012345, 13:[1,0]} | Setting | State change |
| 14 | UP | | {1: 72012345, 14: [2,4558]} | Setting | Setting |
| 15 | UP | | {1: 72012345, 15:[1,0]} | Setting | State change |

*Table 4.3 Settings of commands used for IC200-MRTU-LW*

| Settings/Commands | Direction | DOWN | UP | Data transmission period | Frame saving period |
|---|---|---|---|---|---|
| 1000 | UP/DOWN | {1000: [1,0,0]} | {0:72012345, 1000: [1,0,0]} | Command | |
| 1001 | UP/DOWN | {1001: [1,3,1,0,20,60,1]} | {0:72012345,1001: [1,3,1,0,20,60,1]} | Command | |
| 1004 | UP/DOWN | {1004: [1,0,60,0,0,5,0]} | {0:72012345,1004: [1,0,60,0,0,5,0]} | Command | |
| 1006 | UP/DOWN | {1006: [1,30,0,0,0,1]} | {0: 72012399, 1006: [1, 30, 0, 0, 0, 1]} | Command | |
| 1007 | UP/DOWN | {1007: [2,1,20,3,1,1,3,0,10,1,-0,-1000, 1000]} | {0: 1706774091, 1007: [2, 1, 20, 3, 1, 1, 3, 0, 10, 1, 0, -1000, 1000]} | Command | |
| 1014 | UP/DOWN | {1014:[0,1,1,1,1]} | {0:72012345,1014: [0,1,1,1,1]} | Command | |
| 2001 | DOWN | {2001:[1]} | | Command | |
| 2002 | UP/DOWN | {2002:[1]} | {0:72012345,2002:[1]} | Command | |

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| Settings/Commands | Direction | DOWN | UP | Data transmission period | Frame saving period |
|---|---|---|---|---|---|
| 2004 | UP/DOWN | {2004:[1,5]} | {0:72012345,2004:[1,5]} | Command | |
| 2005 | UP/DOWN | {2002:[1]} | {0:72012345,2005:[1]} | Command | |
| 2006 | UP/DOWN | {2006:[1]} | {0:72012345,2006:[1]} | Command | |
| 2007 | UP/DOWN | {2007:[1]} | {0:72012345,2007:[1]} | Command | |
| 2008 | UP/DOWN | {2008:[1]} | {0:72012345,2008:[1]} | Command | |
| 2009 | UP/DOWN | {2009:[1]} | {0:72012345,2009:[1]} | Command | |
| 2010 | UP/DOWN | {2010:[1]} | {0:72012345,2010:[1]} | Command | |
| Device information frame includes frames: (0,5,9,4,8,2,3,10) | UP | | {0: 1706845405, 1: 73012347, 5: [0, 1], 9: 0, 4: 45, 8: 0, 2: 6303, 3: 10848, 10: [-42, 14]} | 48 hours. For example 24 hours | 48 hours. For example 24 hours |
| 13 | UP | | {1: 72012345, 13:[1,0]} | Setting | State changed |
| 14 | UP | | {1: 72012345, 14:[2,4558]} | Setting | Setting |
| 15 | UP | | {1: 72012345, 15:[1,0]} | Setting | State changed |
| 16 | UP | | {0: 1707308520, 16: [1, 0, 122547818191810634-92]} | Setting | Setting |

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*Table 4.4 Settings of commands used for IC200-MBUS-LW*

| Settings/Commands | Direction | DOWN | UP | Data transmission period | Frame saving period |
|---|---|---|---|---|---|
| 1000 | UP/DOWN | {1000:[1,0,0]} | {0:72012345, 1000: [1,0,0]} | Command | |
| 1001 | UP/DOWN | {1001:[1,3,1,0,20,60,1]} | {0:72012345,1001: [1,3,1,0,20,60,1]} | Command | |
| 1004 | UP/DOWN | {1004:[1,0,60,0,0,5,0]} | {0:72012345,1004: [1,0,60,0,0,5,0]} | Command | |
| 1014 | UP/DOWN | {1014:[0,1,1,1,1]} | {0:72012345,1014: [0,1,1,1,1]} | Command | |
| 1008 | UP/DOWN | {1008:[1,30]} | {0:72012345,1008: [1,30]} | Command | |
| 1009 | UP/DOWN | {1009:[1,74954825,3, [4,5,9]]} | {0: 1706844407, 1009: [1, 74954825, 3, [4, 5, 9]]} | Command | |
| 2001 | DOWN | {2001:[1]} | | Command | |
| 2002 | UP/DOWN | {2002:[1]} | {0:72012345,2002:[1]} | Command | |
| 2004 | UP/DOWN | {2004:[1,5]} | {0:72012345,2004: [1,5]} | Command | |
| 2005 | UP/DOWN | {2002:[1]} | {0:72012345,2005:[1]} | Command | |
| 2006 | UP/DOWN | {2006:[1]} | {0:72012345,2006:[1]} | Command | |
| 2007 | UP/DOWN | {2007:[1]} | {0:72012345,2007:[1]} | Command | |
| 2008 | UP/DOWN | {2008:[1]} | {0:72012345,2008:[1]} | Command | |
| 2009 | UP/DOWN | {2009:[1]} | {0:72012345,2009:[1]} | Command | |
| 2010 | UP/DOWN | {2010:[1]} | {0:72012345,2010:[1]} | Command | |
| Device information frame includes frames: | UP | | {0: 1706845405, 1: 73012347, 5: [0, 1], 9: | 48 hours. For example 24 hours | 48 hours. For example 24 hours |



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| Settings/Commands | Direction | DOWN | UP | Data transmission period | Frame saving period |
|---|---|---|---|---|---|
| (0,5,9,4,8,2,3,10) | | | 0, 4: 45, 8: 0, 2: 6303, 3: 10848, 10: [-42, 14]} | | |
| 13 | UP | | {1: 72012345, 13:[1,0]} | Setting | State changed |
| 14 | UP | | {1: 72012345, 14: [2,4558]} | Setting | Setting |
| 15 | UP | | {1: 72012345, 15:[1,0]} | Setting | State changed |
| 17 | UP | | {17: h'C261-C3650095244372063-00266DC00'} | Setting | Setting |

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